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High-throughput screening and selection of electrogenic microbial communities using single chamber microbial fuel cells based on 96-well plate array

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We demonstrate a single chamber, 96-well plated based Microbial Fuel Cell (MFC) with printed electronic components. This invention is aimed at robust selection of electrogenic microbial community under specific conditions, e.g. electrode potential, pH, nutrient concentration, salt concentration that can be altered within the 96 well plate array. This invention enables robust selection of electrogenic microbial community under homogeneous reactor, with multiple conditions that can be altered to allow comparative analysis. It can be used as a standalone technique or in conjunction with other selective processes, e.g. flow cytometry, microfluidic-based dielectrophoretic trapping. Mobile conductive elements, like carbon paper, carbon sponge, activated charcoal granules, metal mesh, can be inserted inside to increase the anode surface area in order to collect electrogenic microorganisms and to transfer them into new reactors or for other analytical works. This 96-well plate enables robust selection for electrogenic microorganisms under homogeneous reactors, with multiple conditions that can be altered to allow comparative analysis. An array of 96-well plate allows this device to be operated by automated pipetting stations. Well plate MFC can be also used as a multi-compound biosensor system, especially in conjunction with genetically engineered strains that can indicate and quantify single molecule. Electric signal can be used as a direct output, reducing the post-production quality control steps.

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